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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Single ice crystal measurements during nucleation experiments with the depolarization detector IODE" *by* M. Nicolet et al.

Anonymous Referee #2

Received and published: 9 February 2009

Review of Nicolet et al.

This paper describes the first deployment of a new instrument to measure the depolarization of scattered light signals from particles exiting a continuous flow IN chamber. The instrument works in a single particle mode, and the depolarization ratio and perpendicular scattering intensity are related to the degree of ice formation, relative to water drop formation. The instrument is new and, although it still has some issues with mechanical alignment/backgrounds, appears to be responding to ice crystals as expected. Work on the detection limit is required for this instrument to reach its full potential.

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Interactive Discussion
Discussion Paper

I would have recommended that the paper be called a Technical Note, but it is true that some snapshots of new data are presented on Snomax, Israeli Dust and Saharan Dust so I think it straddles the line between being a Technical Note and not.

The application is novel, and so I recommend publication. Nevertheless, the results are not substantial, plus I found that some descriptions of the experimental data to be heavy going. Any clarity that the authors could give to the text of a final version would be valuable. In particular, in the Discussion, it would be useful to bring into focus the detection limit of the instrument, how it was determined and what limitations it may bring to the discrimination between ice and water droplets.

A few specific comments/questions:

- P 20972, L 25 – “parasite” ?

- Eq 10 – What is Rconv? Also, why are the units included for some quantities and not others?

- P 20974, L 4 – Scattered light from the surrounding air?

- P 20974, L 13 – Is it true that the particle velocity is 0.1 m/s? This seems fast. L24 – Replace colon with period.

- L20976, L15 – Can you give more details on what determines whether the flow is too high/low? L26 – spelling “traditional”

- Figure 3 caption – indicate that the temperature is the particle temperature. Also, grammar: “is” plotted in panel C. Why do the data in Panel E start to rise in intensity before those in Panel C?

- For all the experiments, more information is needed on the preparation of the aerosols – manner of nebulization, size parameters, formed from solutions or dry, losses of particles from NAUA chamber to the ZINC chamber, etc.

- P 20977, L 19 - How is it known that channel 90 represents the lower limit for ice in

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Interactive Comment

the OPC? And why are only data from channels 210 and higher used, as stated two paragraphs later?

- P 20978, bottom of page – How do the authors account for different intensities in scattered signal that arise from particles with different positions within the chamber, i.e. ones closer to the detector giving more signal?

- Table 1. Clarify whether these counts and signals are for the entire experiment, or only during activation.

- P 20980, L1. What does it mean for the OPC to have a detection efficiency of 50 - 60 %? How is this value known? Are all the activated fraction values in the paper taking this into account? L5. It should be explained what type of calculations are being compared against.

- P 20981, L 16. The water droplet breakthrough events should be described in more detail. How is it known that water droplets break through the evaporation region? What temperatures was it run at? Are the droplets expected to break through, based on known evaporation rates?

- P 20982, L 8. How is it known that the peak identities can be assigned in this manner?

- Figure 10. Are these data from the OPC?

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 20965, 2008.